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The Engineer in Military Operations Other Than War:

A Critical Asset for American Leadership

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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The Engineer's contribution at both the strategic and the operational levels for Military Operations Other Than War (MOOTW) is a valuable tool to American leadership. Since MOOTW can take many different and diverse characteristics, the Engineer's support role must be able to support a wide range of mission possibilities. Preparation solely for the one or two Major Regional Contingency (MRC) scenarios subordinated many aspects currently encountered in a multitude of military operations other than war -- which are now, ironically, our primary focus and have risen to critical importance. Whether for strategic nation building endeavors or for counterdrug operations in the Colombian jungles or disaster recovery operations in the Philippines or Florida, Engineer operations are directly linked to our national security strategy -- these operations help to open markets and keep our forces engaged in critical nations and regions.

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Abstract

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LCDR John Dettbarn
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The Engineer in Military Operations Other Than War:
A Critical Asset for American Leadership

The end of the Cold War changed many of the diplomatic, economic and military paradigms from those originally formulated over a forty year period to counter the predominate military threat of the Soviet Union. As the new world order evolves and sorts itself out, friction and conflict arise in many different areas of the world of vital and important interest to the United States, usually requiring coordinated political, economic, and/or military solutions. All aspects of the United States leadership matrix, from the National Command Authority down to the field commander within the Department of Defense (DoD) and across agency boundaries to the Departments of State, Transportation and Justice will increasing find Engineer assets a critical factor to ensuring mission success.

The Engineer's contribution at both the strategic and the operational levels for Military Operations Other Than War (MOOTW) is a valuable tool to American leadership. Since MOOTW can take many different and diverse characteristics, the Engineer's support role must be able to support a wide range of mission possibilities. Preparation solely for the one or two Major Regional Contingency (MRC) scenarios subordinated many aspects currently encountered in a multitude of military operations other than war -- which are now, ironically, our primary focus and have risen to critical importance. Whether for strategic nation building endeavors or for counterdrug operations in the Colombian jungles or disaster recovery operations in the Philippines

or Florida, Engineer operations are directly linked to our national security strategy -- these operations help to open markets and keep our forces engaged in critical nations and regions.

Engagement in the Dynamic Global Arena and Engineering Assistance

The military commander is most comfortable with a conventional warfare environment and employment of military forces to counter a traditional military threat; decades of practice during the Cold War focused our strategic resources to meet this type of threat. However, the recent shift from the bi-polar security environment of the Cold War to the current, more fluid multi-polar environment created a wake of turbulence and uncertainty throughout the world, including the United States.

To ignore the growing trends of regional instability throughout the world, especially in many important regions such as the Asia-Pacific and Southern Europe, could pose real threats to critical American interests and cause long-term problems. Conventional national security interest focus on weapons proliferation and maritime access are important for American political, economic, and resource interests. Unconventional security challenges abound with the rise of ethnonationalism, religious fundamentalism, and anti-American sentiment. Regional instability or environmental damage resulting from damage to air, food, and water supplies caused by careless consumption patterns, overpopulation, and industrialization, may in the short-term damage America's competitiveness in the global economy.

American foreign policy must continually be reviewed and possibly modified in response to the dynamic world environment. Hence, the current United States' national security strategy[1] and national military strategy[2] are designed around a reduced military force structure, driven in part by the end of the Cold War and the volatility of the international arena, coupled with domestic spending pressures.

In this post-Cold War age of increased interconnectivity, multi- and bi-lateral agreements, and increased global security threats, we must be careful where and how we reduce our forces. The prospect of U.S. military disengagement from the international scene would be viewed quite negatively by the international community. Our withdrawal would be evaluated by nations in various regions as an indication that we are not committed and therefore not to be trusted, and may have dire consequences for our economy. We seek a long-term stability founded on shared regional confidence and we have multiple bi- and multi-lateral security arrangements throughout the world; our withdrawal from these agreements would be politically and economically irresponsible. Further, the military component of American foreign policy is inextricably tied to our economic and political themes. The stability of the major regions of the world is a function of regional security underwritten by a visible forward presence of capable American forces and our credible security assurances.[3] From this vantage point, the contribution of Engineering Assistance is valuable at both the strategic and operational levels since Engineers and infrastructure development form beneficial, permanent links to those nations and regions of importance to our security interests.

Character of MOOTW and Its Relationship to the Engineer

Using the Joint Chiefs of Staff (JCS) definition[4], Military Operations Other Than War "focus on deterring war and promoting peace while war encompasses large-scale, sustained combat operations to achieve national objectives or to protect national interests. MOOTW are more sensitive to political considerations and often the military may not be the primary player."[5] Types of operations include arms control, combating terrorism, counterdrug operations, nation assistance, noncombatant evacuation operations, civil support operations, peace operations, and support to insurgencies.

Military Operations Other Than War typically contain many more political elements than conventional military operations and consequently, are much more difficult, diffuse, and confusing. Additionally, they may have far more intangible objectives, an ill-defined and more elusive opponent, longer duration, and a significantly different operational environment that may range from urban to deeply isolated jungle operations. MOOTW may also be conducted within the broader context of a larger unilateral effort which may involve additional governmental agencies such as the Departments of State, Treasury, Justice, and Transportation, and the Federal Bureau of Investigation. In some many instances, the military component may be subordinate to these agencies in overall effort or it may be involved in a multi-national situation with U.N., NATO, or our other allies.

Historically, the protracted nature of MOOTW and their propensity to occur in isolated regions or in hostile settings which undermine host nation support typically

occur without formal logistics support systems established for major operations -- in other words in an immature theater -- an arena tailor-made for the Engineer.[6]

For a detailed discussion of the Engineer missions in MOOTW, see Appendix A.

Engineer Assistance at the Strategic Level in MOOTW

Bilateral Engineer Assistance, if properly planned and executed, is an influential tool that United States leadership has at its disposal to help successfully execute the National Security Strategy. Engineer Assistance is "one of the most powerful tools available for helping to reduce two of the emerging causative factors for future political instability and conflicts -- environmental crisis and global economic problems." The concept is not to rebuild a nation, but to put in the road to reconstruction and sustainable development through a systematic program of analysis, education, technology transfer, and corrective actions.[7]

A strong emphasis is placed on Engineer Assistance in American foreign policy and international relations:

> "Engineers, whether acting as advisors, trainers, or actual constructors, can render very significant nation assistance . . . physical infrastructure -- roads, bridges, water supplies, dams and levees for flood control, and the like, figure prominently in Third World conflict . . . Its absence becomes a major source of popular discontent, a breeding ground for disaffection and violence . . . Engineer contributions to the second phase (developing self-sufficiency) centers on technical assistance for nation building.[8]

Engineer Assistance[9] is a comprehensive program in needy, friendly countries that includes: a detailed assessment of the host country's engineer management,

environmental, infrastructural, engineering technology, and military engineer problems; followed by a phased campaign of selected training programs, pilot construction projects, and nonstructural corrective actions. The United States has executed this type of program from the start of our history, but most importantly, after the Second World War. It was a major player in our national security strategy as we worked all angles possible to win friends and deter Soviet aggression.

> "The military has played a major role in the emergence of new nations that transcends combat missions and shapes the culture of society of which it is a part. Indeed, the concept of Military Civic Action (MCA) is a formalized approach to what has gone on in an informal manner since the beginning of organized government. It is a process by which the military contributes to the social and economic development of a society. Greek and Roman soldiers had built roads, colonial armies had established public works, and in the United States, the Army Corps of Engineers helped to settle the frontier and maintain transportation arteries. What is important is that in the process of aiding civilians in any Third World country, the host country can increase popular support and credibility for itself, as well as for the established government, and at the same time contribute in a significant way to the development of that country."[10]

As for the future, typical construction projects for the Engineer Assistance program include: water supply and treatment, hazardous and toxic waste remediation, solid waste disposal, recycling, electric power generation, roads, and bridges -- all designed to promote both our own security interests and those of the host nation -- possibly a win-win situation for all involved. "Our experience in the United States, backed by findings of recent national and Congressional commissions, is that public works development can be one of the major means to build democratic institutions and

a market economy."[11] Opening up a country to the global market and democratic influences can only strengthen and sustain our own security position.

Our recent domestic spending debates, and the general isolationist nature of the American public, has drawn several administrations off the foreign aid track. In the early 1990s, Congress chided the administration for not living up to its pledge to make environmental protection a cornerstone of U.S. foreign assistance and not having a more aggressive program for providing clean and safe water.[12] As times change, our focus invariably changes, but losing sight of the benefits of foreign aid, and in particular, the benefits of Engineer assistance may be costly.

One of the most successful programs of nation assistance involved our decades-long $14 billion reimbursable military construction program with Saudi Arabia. Since 1951, the U.S. Army Corps of Engineers has been involved with engineering and construction issues, starting with construction of the Dhahran airfield. Subsequent projects and programs were administered by both the U.S. Army Corps of Engineers and the U.S. Navy Civil Engineer Corps in an effort to provide the host nation with military cantonments and naval facilities, continually preparing the Saudis to maintain and execute future programs themselves. "When the Iraqi invasion occurred, the Saudis' experience with the Corps of Engineers helped convince government officials that they could ask the United States to come into their country and the we would respect their customs, do professional work, and leave when the work was completed. The "nation assistance" benefits from the program were critical to the successful

execution of Desert Shield and Desert Storm."[13] Without the infrastructure in place, the conflict would have taken on a much different character.

At the strategic level, Bilateral Engineer Assistance can provide support to meeting many of the goals presented in President's National Security Strategy:

- Promote democratic institutions and market economies through the expansion and development of various institutions and regions.
- Strengthen confidence in the United States and increase our access to markets, resources, and areas critical to our economy and security. This will allow us to remain engaged and committed to our friends and allies -- effective, high-visibility assistance programs increase cooperation and foster goodwill towards the United States.
- Train host nation personnel -- both civilian and military -- to perform engineer management functions and civil works, handle environmental issues, and respond to natural and man-made disasters.
- Provide a system for developing and emerging nations to address and initiate corrective actions for environmental problems. We recognize that as developing nations work to improve their social and economic development, their contributions to global environmental problems and large scale ecosystem damage caused by industrial pollution will grow commensurably. Therefore, it is in our vital long-term interest to prevent or restrict the use of ineffective wastewater treatment systems, improper procedures for handling toxic wastes, and antiquated high-polluting industrial techniques.
- Provide a vehicle for introducing United States engineering design and construction firms to a rapidly growing global market, thus expanding our economy.
- Obtain effective and realistic training for United States military and civilian engineers through the use of Engineer Assistance projects to improve their ability to meet other mission requirements.

Use of bilateral *vis á vis* multilateral Engineer Assistance is more beneficial and efficient for our interests since our ability to direct and control the quality is easily executed, whereas, we lose some of the visibility and influence afforded through bilateral engagement. But in this era of increased multilateral engagement, interaction

and cooperation with multiple nations in delivering Engineering Assistance must be considered.

The next phase of the paper discusses the Engineer's impact at the operational level of Military Operations Other Than War, followed by Joint Service considerations of Engineer support and employment.

Operational Art and Engineer Assistance in MOOTW

Utilizing the theory and applications of operational art, a blend of troop and contractor engineer forces are able to directly influence the course of action selected by the commander. The following operational art concepts, applicable to engineer forces in MOOTW, identify several of these considerations:[14]

- Preserve friendly force freedom of maneuver through mobility missions such as the breaching of enemy minefields[15] and obstacles and the construction and repair of roads, bridges, ports, and airfields.
- Limit or prevent enemy freedom of maneuver through countermobility missions which create obstacles along potential enemy routes of advance.
- Enhance the survivability of friendly forces through the construction of fortified battle positions, and the hardening of command and control centers and key logistical facilities.

Engineer assets, in the accomplishment of the MOOTW mission, should be concentrated in support of the main effort, and can be used to attack enemy's center of gravity and protect friendly forces. At the operational level, it is critical to determine the operations' center of gravity. For a peacekeeping mission, this may involve opening main supply routes, controlling key terrain, or maintaining boundaries that separate belligerent forces. For a disaster relief operation such as Hurricane Andrew, it was

opening the schools at the soonest possible time -- the simple fact of children returning to school established an atmosphere of normalcy that showed the local population that things were getting better.

While determining the end state of a conflict is difficult during combat, it is even more difficult during MOOTW. Vision must be focused beyond the immediate MOOTW objective and clearly articulate the conditions of success or the end state. Typically, the end state is defined in terms of minimum construction standards which helps to mitigate indefinite engineer work, or "mission creep." Once an end state is identified, preferably at the conception stages of planning, it is crucial that disengagement actions be fully announced and understood by all concerned parties.

There are several critical functions that are performed by Engineer assets that allow the operational commander to directly influence the outcome of the MOOTW: intelligence, maneuver, priority of effort, sustainment, and deception.

Engineers are astute terrain analysts with skills that are useful to operational planners in identifying suitable lines of operation and intermediate logistical bases. Topographic and military geographic intelligence support, critical to Commanders planning or executing MOOTW, provides accurate, timely, and tailored topographic engineering products in order to visualize, operate on, and exploit the objective. Topographic engineering support provides operational and tactically-oriented terrain analyses, nonstandard and substitute maps, and survey data to the theater forces in all phases of operations throughout the area. This information, coupled with strategically-

collected economic and technological information, should allow a useful assessment of the terrain and infrastructure to the Commander.

Movement of operational assets from one location to another is a critical factor to the operational commander. Engineer assets play a vital role to ensure operational maneuver is not interdicted or limited, through their use of terrain and infrastructure assessment skills coupled with mobility operations expertise. In both peacekeeping and disaster recovery operations, roads, bridges, ports, airfields, and lines of communication are kept open and operational.

Engineers also offer the best staff expertise for evaluating the existing infrastructure's ability to support friendly operations. The engineer assessment is conducted to provide an accurate engineer assessment to determine the engineer effort required. Identifying the priority of effort for a peacekeeping mission is similar in many ways to that of the Engineers' normal war-fighting support mission. Disaster relief operations, however, present very different challenges. One of the most important lessons learned in recent disaster relief operations dictates that the needs of the local government are critical to the success of the Engineer mission. The chain of command must work closely with the local government, early in the process, to establish work priorities, including the local fire, police, water, sewage, electrical, and telephone service agencies. Often, when Engineer units deploy domestically for disaster relief operations, they are often requested to assist local law enforcement officials.

Sustainment, one of the traditional roles of Engineer forces, is accomplished through Real Property Maintenance Activities. Engineers play a critical role in developing the infrastructure[16] needed for any MOOTW mission, such as base camps for disaster relief operations and lodgement and expansion operations in austere theaters. Sustainment capabilities are strongly influenced by logistical base and lines of communication capacities, their vulnerability to enemy or natural forces, and the feasibility of rapid repairs and/or expansion.

As for deception, Engineers try to manipulate enemy perceptions to conceal friendly actions. This aspect is more applicable to such operations as: combating terrorism, counterdrug operations, NEOs, peace operations, and support to insurgencies. To be effective, operational deception must seem plausible to confirm enemy expectations. For example, Engineers can create the illusion of expected battle damage for the enemy (earth berms/mounds placed on runways to simulate craters) or construct mock-ups to deceive the enemy (in Kuwait, Seabees built and employed tank mock-ups to simulate coalition force concentrations).

Joint Service Initiatives in Engineer Support

As seen above, we can expect more involvement in MOOTW, in remote areas such as Bosnia, Panama, Somalia, Haiti, Northern Iraq, and the jungles and rivers of Columbia. By doctrine, these operations will be joint and have a significant engineering effort. It is critical to the success of the missions that the Engineer components

organize and train effectively, for failure to do so will result in delayed, inefficient JTF engineer efforts, negatively impacting on the MOOTW mission.

At the operational level, Joint Publication 4-04[17] authorizes the CinC "to exercise directive authority over civil engineering within their areas of responsibility to ensure effective execution of approved Operation Plans, provide efficiency and economy in operations, and prevent or eliminate the unnecessary duplication of facilities and overlapping of functions among Service component commands." Further, the CinC has "the authority to transfer civil engineer functions between or among Service components within the area of responsibility. Peacetime organizations should be tailored and trained to meet those requirements."

The Joint Doctrine Capstone and Keystone Primer embraces continuous coordination and interoperability issues between the forces, units and systems of all Services in order to ensure effective operations. This effectiveness is achieved through the "collective effort to develop and use joint doctrine and joint tactics, techniques, and procedures; the development and use of joint plans; the conduct of joint training; and a materiel development and fielding process . . ."[18] The concept of interservice "team-building" is an important element to the success of joint operations. For the engineering arena, one of the most productive current areas of concentration is exploiting the training environment designed to improve service interoperability.

Lessons learned from joint operations in Panama, Somalia, and Southwest Asia showed that simple differences can cause major misunderstandings. One solution to this problem is the formalization and execution of Joint Service Engineer Training,

designed to integrate the engineer and construction trades of all the services at the earliest possible point -- utilizing the axiom that we operate and fight the way we train. Students from each of the armed services attend common core classes[19] then branch out for additional service-unique training. This joint service training is driven by the Interservice Training Review Organization (ITRO), which was created to reduce costs in DoD by consolidating similar training in the armed services.

More importantly, it will be increasingly crucial that our Engineering officers, who will be placed in strategic positions of responsibility at unified commands, gain greater exposure to Engineers of other services. As we move into the 21st Century, consolidation and reengineering forces may create a "purple suited" Engineer force. One of the initial steps to moving towards this goal is increased interoperability, as presented in Colonel Anderson's proposal for a joint forces Engineer command operating in a contingency operation under a JTF, modeled after the joint forces air component commander (JFACC).[20]

Conclusions

In this era of decreasing resources, rapidly changing environment, and increasing mission, the Engineer plays a critical role in achieving our national security objectives. At the strategic level, nation assistance through the Engineer Assistance program provides a direct link to the national security strategy. Properly managed infrastructure development has a multi-faceted role, in that: good relations are maintained with the host nation, we strengthen our familiarity with the region, we

develop potentially useful infrastructure for future contingency operations, and most importantly, we open up new markets for economic expansion.

At the operational level, an analysis of the Engineer's role utilizing the various tenets of operational art highlighted several of the important aspects of the Engineer involvement in MOOTW. As diverse as MOOTW can be, the Engineer provides the operational commander with highly effective and powerful tools to bridge the gap between policy issues and practical execution.

A discussion of the joint nature and initiatives of the Engineer's role in MOOTW identified some of the transformation and evolution currently underway in an effort to provide a useful, quality product to the operational commander and ultimately, the National Command Authority. As the Engineer mission evolves over the next few years, technology transfer, outsourcing, and increased interoperability experience with contractors and allies will strengthen the Engineer's contribution to MOOTW. The future potential is limited only by the dynamic synergy developed among the Services involved -- we are moving in the right direction.

Appendix A

Engineer Missions in MOOTW

Engineer missions[21] in MOOTW run the gamut from facilities construction to minefield clearance. The Engineer mission involves all aspects of facilities construction and maintenance, i.e., all areas common to civil engineering and infrastructure development. Analogous to most types of conflict, there are several levels of "engineering intensity" that can be employed, ranging from multi-billion dollar nation building programs involving all levels of U.S. leadership down to thousands of dollars spent on Seabee civic action training cruises in the South Pacific, conducted at the tactical level. It is important to note that each aspect of Engineering Support at the tactical or operational level can have strategic implications.

The Engineer supports the theater of operations commander through construction of new facilities or repair or modification of existing facilities. Typically, these requirements in MOOTW are satisfied, in order of priority, by:

- Maximum use of existing facilities (U.S. or host nation controlled).
- Modification of existing facilities rather than new construction.
- Expedient and initial standard construction and site preparation necessary for emplacement and operation of unit equipment and beddown of troops.
- "Temporary" standard construction.

The unified Commander in Chief (CinC) or Joint Task Force (JTF) commander establishes broad construction policies and standards and designates a staff Engineer (from any service). To assist this Engineer, the commander may establish a regional contingency engineering management (RCEM) cell to provide policy interpretation, oversight and project prioritization recommendations. The RCEM cell does not have command and control responsibility. The mission of the RCEM manager may include the following:[22]

- Set construction priorities and policies based on CinC's guidance.
- Allocate force construction capability.
- Balance Engineer support to operational and logistical requirements.
- Manage construction materials.
- Plan for future construction.
- Program construction funding requirements.

Allocation of Engineer resources may fluctuate significantly between mature and immature theaters, and is a function of the existing infrastructure and mission requirements. Missions can be completed by host nation resources, U.S. construction contracting, or troop construction. The use of large, multi-functional civilian contractors

LOGCAP (Logistics Civil Augmentation Program) to perform various theater support Engineering projects is usually desirable and may be feasible in many overseas areas. LOGCAP contractors usually can meet large-scale construction requirements 30 days after an operation begins and due to this capability, joint service Engineer construction is required only until the LOGCAP construction contractor arrives in theater.

The Engineer also provides real estate support to the commander, other services and allies throughout the theater and is responsible for acquisition and disposal of real property. Typically in MOOTW, leased facilities for berthing, administrative, and industrial activities, if available, are the first priority in the acquisition phase. The Engineer usually becomes very adept at negotiating leases with the host country and learns to deal with the uncertain duration required for the lease, cultural conflicts with the host country (e.g., bartering, bribery, tough/astute negotiators, etc.), and constant, rapidly changing requirements. This type of engineer expertise is usually non-organic to the forces in theater and is augmented as required.

The size and composition of the Engineer unit and accompanying responsibility will vary depending on the circumstances of the mission and the on site conditions. If the force, whether it be peacekeeping or disaster recovery, is moving into an area with no facilities, the requirement for construction engineering skills will depend on whether the force will construct its own facilities, another country's engineers will construct them, or the work will be contracted. If the force moves into existing facilities, the requirement for construction skills will depend on who is tasked to maintain the facilities. Although the requirement for combat engineers may be small, there is a possible need for this type of force to construct barriers, provide assistance and training in engineering skills, or conduct countermine operations, either in contested areas or along peacekeeping force patrol routes. For disaster relief operations, combat engineering skills may be useful for debris removal and general clearing operations. The majority of engineer operations fall into one of two categories: Sustainment Engineering, and Engineering Combat Service Support and Survivability Enhancements.

Sustainment Engineer missions include those tasks that support the force through the construction and repair of billeting, support, and logistic facilities, as well as Lines of Communication (LOCs). These tasks may include the construction, maintenance, and operation of electrical and sanitation utilities as well as locating water sources, operating reverse osmosis water purification units, and drilling wells, if necessary, for water supply. Sustainment Engineering support must be in accordance with agreements between the parties in the conflict and the host nations, as applicable, and must comply with Title 10, USC 401 unless support is provided under Section 551 of the Foreign Assistance Act of 1961 (22 USC 2348).

The purpose of sustainment engineering is to provide an adequate support base for the operating force, whether it be a peacekeeping force or a JTF designated for

disaster recovery operations. The base must provide secure and healthy living conditions and it must provide sufficient administrative and maintenance space for the units supporting the force, and secure storage for all associated supplies and materiel.

Specific engineer sustainment and disaster control and recovery operations missions[23] include: construction and maintain base facilities; repair of battle/disaster damaged facilities; air bases, ports, and other logistics facilities construction; LOC construction and maintenance; potable water source development; and emergency public works operations functions.

Engineering Combat Service Support and Survivability Enhancements missions include combat engineering tasks (e.g., mobility, countermobility, and survivability) conducted by Engineer units constructing: command posts, bunkers, and observation posts; constructing force protection structures such as earth revetments, wire obstacles, and defensive positions; clearing fields of observation; demolishing fortifications; clearing or marking minefields (including minefield fence maintenance); providing backup support for explosive ordnance identification, marking, removal, or demolition; and the explosive breaching of obstacles. Survivability enhancement missions involve hardening facilities against natural or enemy threats, including: command and control; airfields and ports; LOCs; petroleum, oil, and lubricants (POL); and ammunition storage facilities.

Notes

[1] William J. Clinton, A National Security Strategy of Engagement and Enlargement, (The White House, February 1995).
[2] John M. Shalikashvili, National Military Strategy, (Washington: Joint Chiefs of Staff, February 1995).
[3] Richard C. Macke, "Testimony before the United States Senate Appropriations Committee, Subcommittee on Defense," Commander in Chief, U.S. Pacific Command, 15 February 1995.
[4] Another definition provided by Jay Smith, Operational Art in Military Operations Other Than War, (Newport, RI: U.S. Naval War College, 1995), 3, in which MOOTW is defined as "the use of military or paramilitary forces to achieve military objectives, but on a scale smaller than conventional war. It includes nation assistance, insurgency, counter-insurgency, counter-terrorism operations, raids, rescue missions, peace-keeping operations, counter-drug efforts, and the like."
[5] U.S. Joint Chiefs of Staff, Joint Doctrine Capstone and Keystone Primer, (Washington: May 1995), 39-42.
[6] The President's National Security Strategy identifies several areas regarding MOOTW that are pertinent to the Engineer, and these include: nation assistance, disaster relief, civil works in the United States, assistance in the drug war (infrastructure development in foreign countries), national research and development, promoting democracy and human rights, humanitarian assistance, appropriate strategies for economic development, international civilian rapid response capability for humanitarian crises, environmental issues, and peace operations to support democracy or conflict resolution.
[7] Albert J. Kraus, A Strategic Imperative for the 90s: Expanding Bilateral Engineer Assistance, (Carlisle Barracks, PA: U.S. Army War College, 1991), 16.
[8] "Supporting U.S. Strategy for Third World Conflict," Report of the Regional Conflict Working Group, June 1988, 36-37.
[9] Another definition of nation building: "In concert with the needs and desires of host nations, we can help improve a country's ability to carry out public functions and services in response to societal needs that contribute greatly to promoting the ideals of democracy, reducing the need for military response and enhancing the effectiveness of military forces should deterrence fail." Gregg F. Martin, From Vietnam to Beyond the Cold War: The Evolution of U.S. Army Engineer Forces, 1973-1991, (Newport, RI: Naval War College, March 1992), 99.
[10] "John W. DePauw and George A. Luz, Winning the Peace: The Strategic Implications of Military Civic Action, (Carlisle Barracks, PA: U.S. Army War College, Strategic Studies Institute, 1990), 1.
[11] Salt, Rock, "Nation Assistance Initiative," Speech by the Corps of Engineers, 23 July 1990, 1-5.
[12] U.S. Congress, Senate, Committee on Appropriations, Foreign Operations, Export, Financing, and Related Programs Appropriation Bill, 1991, Report 101-519, 39 and 87.
[13] Henry H. Hatch and Janet A. McDonnell, "Corps of Engineers: Laying the Groundwork for Theater Operations," Military Review, vol 72, no. 3, March 1992, 3.
[14] Phillip R. Anderson, Engineer Support of the Operational Art, (Newport, RI: Naval War College, 1989), 1-5.
[15] Recent deployment experiences, including Bosnia, clearly show that joint Engineers must be proficient in countermine operations. Estimates indicate that more than 100 million uncleared land mines are spread throughout 62 countries. This equates to about one land mine for every 50 people on Earth. Cheap and easily constructed, land mines are the third world's weapon of choice; they directly threaten civilian populations and joint force operations. Vern Lowery, "Lessons Learned: Joint Engineer Operations," Engineer, August 1995, 46-48.
[16] See the section above under Engineer Missions in MOOTW for a more detailed description of sustainment Engineering.
[17] U.S. Joint Chiefs of Staff, Joint Publication 4-04: Joint Doctrine for Civil Engineering Support, (Washington: May 1995), III-1.
[18] U.S. Joint Chiefs of Staff, Joint Doctrine Capstone and Keystone Primer, (Washington: May 1995), 11.
[19] Joint service training for equipment operators and Engineering aids are trained at Fort Leonard Wood, MO; Utilitiesman (plumbers) and electricians are trained at Shepard Air Force Base in Wichita Falls, TX; builders and

steelworkers are trained at the Naval Construction Training Center in Gulfport, MS; and mechanics are trained at the Naval Construction Training Center in Port Hueneme, CA.

[20] Jerry L. Anderson, "Joint Forces Engineer Command: A Proposal," Engineer, April 1995, 17-19.

[21] This definition, adapted from the JTTP for Peacekeeping Operations, covers much of what the Engineer mission encompasses in operations short of war. The definition is practical for all operations. Joint Chiefs of Staff, JTTP for Peacekeeping Operations, Joint Publication 3-07.3, pages VII-12 to VII-13.

[22] Jeb Stewart, "Engineer Theater Support Operations," Engineer, April 1994, 16-22.

[23] Typical Engineer tasks range from timber bunker construction in a forward ground combat environment to construction and operation of an advanced industrial facility in support of joint operating forces and the logistics pipeline. Typical construction capabilities include construction of: ammunition supply points, expeditionary bulk liquid storage facilities, aviation support facilities, battle damage repair including rapid runway repair, expeditionary shelters for operations, communications, maintenance warehousing, personnel support structures, erection of combat zone hospitals, port improvement or construction, security fencing, well drilling, expanding and upgrading unimproved roadway systems, and installing permanent (non-standard) and fixed-panel bridges.

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